an automatic guillotine device positioned and configured to cut the rigid void-free composite product,

wherein said glass filaments deposited in said process in total comprise more than 40 % by weight of said glass filaments and said filaments of thermoplastic organic material deposited in said process.

REMARKS

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 1 and 5-14 are presently pending in this application, Claims 1, 8-10, 13 and 14 having been amended by this amendment.

In the outstanding Office Action, Claims 1 and 5-14 were rejected under 35 U.S.C. §112, first paragraph, for containing subject matter not described to reasonably convey that the inventors had its possession; Claims 1 and 5-14 were rejected under 35 U.S.C. §112, second paragraph, for being indefinite; Claims 1 and 5-14 were rejected under 35 U.S.C. §103(a) as being unpatentable over Francis (U.S. Patent 2,543,101) in view of O'Conner (U.S. Patent 4,800,113), and alternatively further in view of PCT WO 90/14457 (hereinafter "WO '457").

The Claims 1, 8-10, 13 and 14 and the English translation of the original PCT application have been amended herein. In particular, the word "non-porous" has been replaced with "void-free" in Claims 1, 8-10, 13 and 14, and the phrase "rigid void-free" has been added before the word "composite sheets" in page 8, line 35, page 10, line 26, page 11, line 29, of the English translation as show above. These amendments are supported by the

original PCT application in French, since the French word "plaque" found in page 3, lines 12, 16, page 7, lines 2, 5, page 8, line 2, page 9, lines 16, 18, page 10, lines 13, 17, page 11, line 31, page 12, line 9, 11, page 13, line 7, of the original PCT application in French. The definition of "plaque" is given in the reference "Grand Larousse en 5 volumes," Ed. Larousse, vol. 4, p. 2418 (1987) as follows: "une feuille de matière quelconque, <u>pleine</u>, large et peu èpaisse, maise <u>rigide</u>" (emphasis added with underline). The French word "pleine" with respect to material according to the same reference means "qui est fait dans un matèriau qui ne comporte <u>pas de vide</u>" (emphasis added with underline). The underlined phrase "<u>pas de vide</u>" literally translates to "no empty space." Therefore, this amendment to the English translation of the original PCT application in French is believed to be supported by the original PCT application in French, and thus is not believed to raise a question of new matter.[1]

With regard to the rejections under 35 U.S.C. §112, first and second paragraphs, because of the amendments to the claims and the English translation of the original PCT application in French presented above, these rejections are believed to be overcome.

Briefly, Claim 1 of the present invention is directed to a method for continuously manufacturing a composite product including preparing intimately blended commingled threads containing glass filaments and filaments of thermoplastic organic material, providing a strip of fabric made from the intimately blended commingled threads and a plurality of continuous threads including at least 80% by weight of the intimately blended commingled

[1] MPEP 2163.07 states that "[w]here a non-English foreign priority document under 35 U.S.C. 119 is of record in the application file, applicant may not rely on the disclosure of that document to support correction of an error in the pending application" but that "[t]his prohibition does not apply in a situation where the original application is in a non-English language ...."

threads, continuously depositing onto a moving conveyor two layers, one of the two layers including the plurality of continuous threads in a form of at least one of continuous threads continuously deposited in a direction of movement of the moving conveyor, continuous threads continuously deposited in a form of superposed loops and continuous threads continuously deposited in a form of chopped threads, and the other one of the two layers including the strip of fabric, continuously transferring the two layers combined through a plurality of zones where the two layers are heated and cooled while being sufficiently compressed to form a continuous rigid void-free composite material capable of being molded, and at least one of cutting up the rigid void-free continuous composite material into a plurality of sheets and sufficiently softening the continuous rigid void-free composite material to wind onto a rotating drum. According to Claim 1, the glass filaments deposited in the process in total comprise more than 40 % by weight of the glass filaments and the filaments of thermoplastic organic material deposited in the process.

By continuously depositing the two layers containing glass threads and thermoplastic organic material and transferring the two layers as such, not only a rigid void-free composite material whose content of reinforce fibers is exceedingly high can be continuously manufactured,[2] but also a high content of reinforcing fibers can be readily promoted evenly throughout the rigid void-free composite product. As a result, rigid void-free continuous composite products manufactured have strength which is equal or higher than those manufactured simply by increasing glass content.[3]

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[2] Specification, page 15, lines 7-11.

[3] Id. lines 28-38.

Francis discloses a method for manufacturing a composite product having a layer of prefabricated textile material and a layer of felt-like material.[4] However, Francis does not teach the continuously depositing and transferring steps, wherein the glass filaments deposited in the process in total comprise more than 40 % by weight of the glass filaments and the filaments of thermoplastic organic material deposited in the process as recited in Claim 1.

The Francis felt-like product is obtained from a pre-formed bat made of fabric and either a liquid adhesive material or a fibrous layer comprising potentially adhesive fibers or such fibers admixed with non-adhesive fibers, and the whole is subjected to heat and pressure to effect a firm binding of the fibers in the bat and to secure the permanent adhesion and anchoring to the bat of the fabric.[5] However, when applying a substantial compacting pressure to reduce the product so that it has the thickness and the density desired, the final product thus obtained in Francis still has its felt-like structure. Otherwise, the final product cannot be used for the applications disclosed in Francis, i.e., a flat felt *per se*, or molded or shaped over three dimensional objects having rounded or squared contours or other configuration departing from a simple single-plane flat surface without bursting or tearing.[6] Thus, the structure of the final composite product disclosed in Francis is very light weight, thick, felt-like structure characterized by a low density, high porosity and permeability, without sacrifice of firmness and tensile strength.[7] The manufacturing process of the Francis product as disclosed in Fig. 1 also supports these preceding discussions. Specifically, the

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[4] Francis, column 1, lines 1-7.

[5] Id., column 7, lines 4-17.

[6] Id., column 11, lines 28-36.

[7] Id., column 11, lines 52-56.

Francis process necessarily involves a zone just after the rollers 21, 22 in which the pre-formed bat is exposed to heated air blown by the blower 26 and the heated air is drawn downwardly through the product by the exhaust pump 27.[8] The product then passes from the heating zone into a confined cooling zone in which cool air is directed upon the product by the blower 30 and drawn downwardly therethough by the exhaust blower 32.[9] In the heating and cooling steps of the process disclosed in Francis, it is absolutely necessary to maintain a certain degree of porosity so as to permit air to pass through the composite and the belt 3, thus extracting the air by the exhaust blowers 27, 32.

Furthermore, Fig. 4 of Applicants' drawings shows the mechanical behavior of the composites according to the present invention, in particular, the flexural strength and the tensile strength (expressed in MPa) relatively to the glass content expressed either in weight % or in volume %. The products disclosed in Francis clearly do not belong to the same category of composite materials because their mechanical properties cannot be assessed under the conditions of Fig. 4 in order to measure the flexural strength and the tensile strength. The felt-like structure disclosed in Francis, even if consolidated, is totally inconsistent with such measurements. For example, a flexural test measures the force a composite supported in two points can withstand until rupture occurs. As such, the composites disclosed in Francis and the present invention are not to be compared properly.

On these bases, Applicants respectfully submit that the process disclosed in Claim 1 is distinguishable from Francis.

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[8] Id., column 9, lines 17-25.

[9] Id., lines 26-33.

The outstanding Office Action asserts that O'Connor discloses utilizing commingled fibers in the composite article manufacture. However, O'Connor does not teach the continuously depositing and transferring steps, wherein the glass filaments deposited in the process in total comprise more than 40 % by weight of the glass filaments and the filaments of thermoplastic organic material deposited in the process. On the contrary, the O'Connor method only discloses "intermingling" filaments of thermoplastic and continuous filaments of reinforcing fibers, weaving these filaments into a fabric, and heating the fabric.[10] O'Connor therefore does not disclose providing a strip of fabric and a plurality of continuous threads as recited in Claim 1. Nor does O'Connor disclose continuously depositing two layers, one of the two layers including the plurality of continuous threads in a form of at least one of continuous threads continuously deposited in a direction of movement of the moving conveyor, continuous threads continuously deposited in a form of superposed loops and continuous threads continuously deposited in a form of chopped threads, and the other one of the two layers including the strip of fabric. As such, O'Connor does not disclose the adequate contact between the strip of fabric and the layer made of at least one of the continuous threads disclosed by Applicants. Accordingly, the process recited in Claim 1 is clearly distinguishable from O'Connor.

Likewise, WO '457 discloses a method for producing a fiber reinforced plastic material, but does not teach the continuously depositing and transferring steps, wherein the glass filaments deposited in the process in total comprise more than 40 % by weight of the glass filaments and the filaments of thermoplastic organic material deposited in the process as discussed above. Thus, the process recited in Claim 1 is also distinguishable from WO '457.

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[10] O'Conner, columns 6-7.

Since none of Francis, O'Conner and WO '457 teaches the continuously depositing and transferring steps, wherein the glass filaments deposited in the process in total comprise more than 40 % by weight of the glass filaments and the filaments of thermoplastic organic material deposited in the process as recited in Claim 1, even the combined teachings of these cited references would not render the process recited in Claim 1 obvious.

Since independent Claims 13 and 14 include subject matter substantially incorporating what is recited in Claim 1, Claims 13 and 14 are also distinguishable from Francis, O'Conner and WO '457.

For the foregoing reasons, Claims 1, 13 and 14 are believed to be allowable. Furthermore, because Claims 5-12 ultimately depend from Claim 1 and contain limitations not taught by the references of record, substantially the same arguments set forth above also apply to these dependent claims. Hence, Claims 5-12 are believed to be allowable as well.

In view of the amendment and discussions presented above, it is respectfully submitted that the present application is in condition for allowance, and an early action favorable to that effect is earnestly solicited.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.

Gregory J. Maier
Registration No. 25,599
Robert T. Pous
Registration No. 29,099
Attorneys of Record

22850

Tel: (703) 413-3000
Fax: (703) 413-2220
GJM/RTP/AY:fmw
I:\ATTY\AKY\1s\1247\12470709.amc6.wpd

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IN THE SPECIFICATION

Please replace the paragraph at page 8, line 34, through page 9, line 3, with the following text:

--Figure 1 shows diagrammatically a line for production of <u>rigid void-free</u> composite sheets which includes upstream at least one multistorey creel 10 on which is placed a multiplicity of windings of commingled threads 11. The threads extracted from these windings are guided and combined by various members before entering a cutter 12. The chopped threads are collected an transferred by means of a conveyor belt 13 into a storage silo 14.--

Please replace the paragraph at page 10, lines 25-33, with the following text:

--Figure 2 shows diagrammatically a line for production of <u>rigid void-free</u> composite sheets according to a second embodiment of the invention. As in the preceding embodiment, a creel 10, on which a multiplicity of windings of commingled threads 11 is placed, is fitted at the beginning of the line. These threads also feed a cutter 12. The threads chopped by this means are collected and transferred by a conveyor belt 42 to the top of a hopper 43 placed above a moving conveyor 19.--

Please replace the paragraph at page 11, lines 28-30, with the following text:

--Figure 3 shows diagrammatically a line for production of rigid void-free composite sheets according to a third embodiment of the invention.--

IN THE CLAIMS

Please amend Claims 1, 8, 9, 10, 13 and 14 as follows:

--1. (Seven Times Amended) A process for continuously manufacturing a rigid [non-porous] void-free composite product, comprising the steps of:

preparing intimately blended commingled threads containing glass filaments and filaments of thermoplastic organic material;

providing a strip of fabric made from the intimately blended commingled threads and a plurality of continuous threads including at least 80% by weight of the intimately blended commingled threads;

continuously depositing onto a moving conveyor two layers, one of the two layers including said plurality of continuous threads in a form of at least one of continuous threads continuously deposited in a direction of movement of said moving conveyor, continuous threads continuously deposited in a form of superposed loops and continuous threads continuously deposited in a form of chopped threads, and the other one of the two layers including said strip of fabric;

continuously transferring said two layers combined through a plurality of zones where said two layers are heated and cooled while being sufficiently compressed to form a continuous rigid [non-porous] void-free composite material capable of being molded; and

at least one of cutting up said rigid [non-porous] void-free continuous composite material into a plurality of sheets and [sufficiently softening] winding said continuous rigid [non-porous] void-free composite material [to wind] onto a rotating drum,

wherein said glass filaments deposited in said process in total comprise more than 40 % by weight of said glass filaments and said filaments of thermoplastic organic material deposited in said process.

8. (Five Times Amended) A process according to Claim 7, wherein:

said one of the two layers is continuously deposited on said moving conveyor and is formed of said chopped threads;

said other one of the two layers is continuously deposited on said one of the two layers and is formed exclusively by said intimately blended commingled threads;

a third layer of chopped intimately blended commingled threads of glass filaments and filaments of a thermoplastic organic material is continuously deposited onto said other one of the two layers;

a combination of said two layers and said third layer thus formed is continuously transferred into a first zone where said combination is heated and then into a second zone where said combination is sufficiently compressed and heated to become rigid and [non-porous] void-free;

said combination is then continuously transferred into a third zone where said combination is sufficiently compressed and cooled to become rigid and [non-porous] void-free, thereby forming a continuous rigid [non-porous] void-free composite material capable of being molded; and

said continuous rigid [non-porous] void-free composite material is cut up at an exit of the third zone.

9. (Five Times Amended) A process according to Claim 7, wherein:

said other one of the two layers is continuously deposited on said moving conveyor and is formed exclusively of said intimately blended commingled threads;

said one of the two layers is continuously deposited on said other one of the two layers and is formed of said chopped threads;

a third layer exclusively formed by intimately blended commingled threads of glass filaments and filaments of a thermoplastic organic material is continuously deposited onto said one of the two layers;

a fourth layer of chopped intimately blended commingled threads of glass filaments and filaments of a thermoplastic organic material is continuously deposited onto said third layer;

a combination of said two layers, said third layer and said fourth layer thus formed is continuously transferred into a first zone where said combination is heated, and then into a second zone where said combination is sufficiently compressed and heated to become rigid and [non-porous] void-free;

said combination is continuously transferred into a third zone where said combination is sufficiently compressed and cooled to become rigid and [non-porous] void-free, thereby forming a continuous rigid [non-porous] void-free composite material capable of being molded; and

the continuous rigid [non-porous] void-free composite material is cut up at an exit of the third zone.

10. (Five Times Amended) A process according to Claim 7, wherein:

said other one of the two layers is continuously deposited onto said moving conveyor and is formed exclusively by said intimately blended commingled threads;

said one of the two layers is continuously deposited on said other one of the two layers;

a third layer formed exclusively by commingled threads of glass filaments and filaments of a thermoplastic organic material is continuously deposited onto said one of the two layers,

a fourth layer is continuously deposited on said third layer, said fourth layer being formed of commingled threads of glass filaments and filaments of a thermoplastic organic material;

a combination of said two layers, said third layer and said fourth layer thus formed is continuously transferred into a first zone where said combination is heated, and then into a second zone where said combination is sufficiently compressed and heated to become rigid and [non-porous] void-free;

said combination is continuously transferred into a third zone where said combination is sufficiently compressed and cooled to become rigid and [non-porous] void-free, thereby forming a continuous rigid [non-porous] void-free composite material capable of being molded; and

the continuous rigid [non-porous] void-free composite material is cut up at an exit of the third zone.

13. (Five Times Amended) A device for manufacturing a rigid [non-porous] void-free composite product, comprising:

a storage device for a plurality of windings of commingled threads containing glass filaments and filaments of a thermoplastic organic material;

a cutter fed with a plurality of continuous threads extracted from said windings;

at least one device positioned and configured to transfer, store, and distribute said commingled threads chopped by said cutter in a form of a sheet;

at least one barrel supporting at least two rolls of fabric made of said commingled threads;

a conveyor positioned and configured to receive said commingled threads thus chopped and a strip of said fabric;

a preheating oven placed at an end portion of the conveyor;

a twin-belt press including a plurality of heating drums in an upstream portion of said twin-belt press and a plurality of cooled rollers in a downstream portion and a central portion of said twin-belt press, said heating drums being configured to sufficiently heat and compress said commingled threads chopped and said strip of fabric to become rigid and [non-porous] <u>void-free</u>, and said cooled rollers being configured to sufficiently cool and compress said commingled threads chopped and said strip of fabric to become rigid and [non-porous] <u>void-free</u>, thereby forming a rigid [non-porous] <u>void-free</u> composite material capable of being molded; and

an automatic guillotine device positioned and configured to cut the rigid [non-porous] <u>void-free</u> composite product,

wherein said glass filaments deposited in said process in total comprise more than 40 % by weight of said glass filaments and said filaments of thermoplastic organic material deposited in said process.

14. (Five Times Amended) A device for manufacturing a rigid [non-porous] <u>void-free</u> composite product, comprising:

a storage device for a plurality of windings of commingled threads containing glass filaments and filaments of a thermoplastic organic material;

a conveyor positioned and configured to receive the commingled threads deposited in a form of at least one of strips of fabric, continuous threads and chopped threads;

a first barrel disposed upstream of said conveyor and supporting at least two rolls of fabric made of said commingled threads;

at least one distribution device configured to distribute said commingled threads in a form of continuous threads, said at least one distribution device being disposed above said conveyor;

a second barrel disposed downstream of said conveyor and supporting at least two rolls of fabric made of said commingled threads;

at least one of a second distribution device configured to distribute said continuous thread and a cutter followed by a third distribution device configured to distribute said continuous threads chopped by said cutter;

a preheating oven placed at an end portion of the conveyor; and

a twin-belt press including a plurality of heating drums in an upstream portion of said twin-belt press and a plurality of cooled rolls in a downstream portion and a central portion of said twin-belt press, said heating drums being configured to sufficiently heat and compress said commingled threads deposited onto said conveyor to become rigid and [non-porous] <u>void-free</u>, and said cooled rollers being configured to sufficiently cool and compress said commingled threads deposited onto said conveyor to become rigid and [non-porous] <u>void-free</u>, thereby forming a rigid [non-porous] <u>void-free</u> composite material capable of being molded; and

an automatic guillotine device positioned and configured to cut the rigid [non-porous] <u>void-free</u> composite product,

wherein said glass filaments deposited in said process in total comprise more than 40 % by weight of said glass filaments and said filaments of thermoplastic organic material deposited in said process.--